Welcome to the **JULY 2012** edition of the WDFW Climate News Digest. The purpose of the digest is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – *thanks* to those who have sent links and references and please keep them coming. We are particularly interested in projects or issues you may be involved in which have a climate change component.

WHAT'S HAPPENING AT WDFW?

Selected projects, agency resources and initiatives

WDFW Climate News Digest on the Web

Looking for an article you may have seen referenced in a previous edition of the climate news digest? Good news! Copies of previous newsletters are now available on our agency website. We are still working on making the attachments accessible, but the links should all be active.

WDFW Stream Habitat Restoration Guidelines – climate change appendix

The revised version of the *Stream Habitat Restoration Guidelines* (SHRG) was published in April, 2012. The purpose of SHRG is to promote process based natural stream restoration using principles of landscape ecology and integrated aquatic ecosystem restoration. Michelle Cramer of WDFW coordinated the development of an appendix which provides guidance on addressing climate change (Appendix A). This appendix includes a summary of contemporary science regarding impacts of climate change on stream systems and stream habitat in Washington, and provides references for further information. The document emphasizes that efforts to restore stream habitat will be inadequate without consideration of climate change – restoration efforts must account for climate change in planning and design in order to increase the likelihood that they will be effective. The appendix provides a summary of recommended appropriate strategies for planning and design of stream habitat restoration efforts in the face of certain climate change. Strategies emphasize accommodating changing processes and uncertainty.

CLIMATE ADAPTATION AT OTHER AGENCIES

Workshop – EPA Region 10 Climate Change TMDL Pilot and South Fork Nooksack River, WA Temperature TMDL -- June 25, 2012

The Environmental Protection Agency (EPA) Region 10 and Washington State Dept of Ecology are conducting a Temperature Total Maximum Daily Load (TMDL) for the South Fork Nooksack River (SFNR) in coordination with the Nooksack Tribe and Lummi Nation. In addition to this Regulatory Objective, Region 10 has partnered with EPA's Office of Research and Development (ORD) and Office of Water (OW) and together initiated a Pilot Research Project to consider how projected climate change impacts for the SFNR could be incorporated into the TMDL and influence restoration plans . EPA is using a "parallel study strategy" to concurrently accomplish the Research Objective (EPA Region 10 Climate Change TMDL Pilot) and Regulatory Objective (SFNR, WA Temperature TMDL). This allows EPA to "learn by doing." The goal of the Pilot Research Project is to (1) provide input to the Regulatory TMDL for additional modeling runs that can capture climate change scenarios and (2) to serve as an example of process and analysis for other TMDLs (see here for a copy of the Agenda with Presentations.

Climate Change Collaboration in the Pacific Northwest – "C3"

C3 is a regional forum of federal agency and science center climate change coordinators and leaders. The forum provides information exchange and enhances collaboration across several Departmental efforts, science centers and agencies at a broad scale**,** helping to bridge each organization's connection to the multiple efforts that are underway. These efforts include federal agencies' research and management activities, the DOI Northwest Climate Science Center, three Landscape Conservation Cooperatives (LCCs) in the Pacific Northwest, the NOAA-funded (RISA) Climate Impacts Research Consortium, and numerous other programs and activities of the universities in the Pacific Northwest. C3 is building an inventory of federal climate change research, research tools, models, modeled scenarios, monitoring programs/projects and assessments related initiated or completed since 2005. The inventory is in development and over 200 projects have been uploaded to date. See: http://www.c3.gov/PNW_inventory.cfm

LEARNING OPPORTUNITIES

Recent webinars now available on the web:

"Accessing and Utilizing Climate and Impacts Datasets and Tools in Data Basin", presentation by Dr. Dominique Bachelet.
In this session, Dr. Dominique Bachelet and members of the Data Basin team provide an overview of available climate datasets, visualization and analysis tools, and example of how people are better able to use this information to inform climate change adaptation and management of global environmental change. Data Basin is a free, online system that connects users with spatial datasets, tools, and expertise. Individuals and organization can explore and download a vast library of datasets, upload their own data, create and publish analysis, utilize working groups, and produce customized maps that can be easily shared.
http://www.youtube.com/watch?v=1xIRKmLUb_4&list=UU3OAy9Z825Z6MgAi_6ZCkzA&index=1&feature=plcp

The Forgotten Season: Conservation Implications of Winter Warming, Caroline M. Williams, Brent J. Sinclair and Jessica J. Hellmann
Description: A rapidly changing global climate has the potential to disturb ecosystem services, diminish endangered and economically important species, and increase pest outbreaks. Winter temperatures are changing rapidly and have important effects on organismal fitness that are often overlooked. In this talk, we explore the impacts of changing winter conditions on insects, an economically and ecologically important group that are highly sensitive to temperature changes. We will look at winter through the lens of energetics, and explore the impact of thermal variability and local adaptation on determining the vitality of insect populations.

The recording for the "The Forgotten Season: Conservation Implications of Winter Warming" webinar is now available online.
Click here to go to the Conservation Science Webinar Series Archive to view the recording or any other Conservation Science Webinar Series recording.

RESOURCES

Toward a Resilient Watershed: Addressing Climate Change Planning in Watershed Assessments *(pdf attached)* is intended to complement or supplement a watershed assessment

process by posing questions related to how climate change will impact the structure and function of the watershed. This guidebook helps watershed managers understand how future climate scenarios could affect their management decisions and identifies proactive measures that could be employed to improve the resilience of stream habitat and water quality. The authors developed the guidebook using results and input from an 18-month climate and watershed project, funded by the Oregon Watershed Enhancement Board. While the information is based on studying Oregon's watersheds, the authors intended for the recommendations to be applicable to other regions across the country.

CLIMATE SCIENCE NEWS

California Sea Level Projected to Rise at Higher Rate Than Global Average; Slower Rate for Oregon, Washington, But Major Earthquake Could Cause Sudden Rise

The sea level off most of California is expected to rise about one meter over the next century, an amount slightly higher than projected for global sea levels, and will likely increase damage to the state's coast from storm surges and high waves, says a new report from the National Research Council. Sea levels off Washington, Oregon, and northern California will likely rise less, about 60 centimeters over the same period of time. However, an earthquake magnitude 8 or larger in this region could cause sea level to rise suddenly by an additional meter or more. Global sea level rose during the 20th century, and projections suggest it will rise at a higher rate during the 21st century. A warming climate causes sea level to rise primarily by warming the oceans -- which causes the water to expand -- and melting land ice, which transfers water to the ocean. However, sea-level rise is uneven and varies from place to place. The report estimates sea-level rise both globally and for those three states for the years 2030, 2050, and 2100.

Extreme Weather and Climate Change

Excerpt from an AP article on extreme weather and climate change: "If you want a glimpse of some of the worst of global warming, scientists suggest taking a look at U.S. weather in recent weeks. Horrendous wildfires. Oppressive heat waves. Devastating droughts. Flooding from giant deluges. And a powerful freak wind storm called a derecho. These are the kinds of extremes climate scientists have predicted will come with climate change, although it's far too early to say that is the cause. Nor will they say global warming is the reason 3,215 daily high temperature records were set in the month of June. Scientifically linking individual weather events to climate change takes intensive study, complicated mathematics, computer models and lots of time. Sometimes it isn't caused by global warming. Weather is always variable; freak things happen. But since at least 1988, climate scientists have warned that climate change would bring, in general, increased heat waves, more droughts, more sudden downpours, more widespread wildfires and worsening storms. In the United States, those extremes are happening here and now."

The Intergovernmental Panel on Climate Change report on extreme weather: http://ipcc-wg2.gov/SREX/

EFFECTS ON SPECIES AND ECOLOGICAL SYSTEMS

Dying trees in Southwest set stage for erosion, water loss in Colorado River (example of potential cascading effects of climate change)

Wendy Peterman, Richard H. Waring, Trent Seager, William L. Pollock. *Ecohydrology*, 2012; DOI: 10.1002/eco.1284

New research concludes that a one-two punch of drought and mountain pine beetle attacks are the primary forces that have killed more than 2.5 million acres of pinyon pine and juniper trees in the American Southwest during the past 15 years, setting the stage for further ecological disruption -- including more water loss in the Colorado River basin. The widespread dieback of these tree species is a special concern, scientists say, because they are some of the last trees that can hold together a fragile ecosystem, nourish other plant and animal species, and prevent serious soil erosion.
It's not certain whether or not the recent tree die-offs are related to global warming, Peterman said. However, the 2007 report of the Intergovernmental Panel on Climate Change projected that while most of the United States was getting warmer and wetter, the Southwest will get warmer and drier. Major droughts have in fact occurred there, and the loss of pinyon pine and juniper trees would be consistent with the climate change projections. "Pinyon pine and juniper are naturally drought-resistant, so when these tree species die from lack of water, it means something pretty serious is happening," said Wendy Peterman, an OSU doctoral student and soil scientist with the Conservation Biology Institute. "They are the last bastion, the last trees standing and in some cases the only thing still holding soils in place. These areas could ultimately turn from forests to grasslands, and in the meantime people are getting pretty desperate about these soil erosion issues," she said.

Genetic change for earlier migration timing in a pink salmon population (pdf attached)

Ryan P. Kovach, Anthony J. Gharrett and David A. Tallmon, Biology and Wildlife Department, Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK
To predict how climate change will influence populations, it is necessary to understand the mechanisms, particularly microevolution and phenotypic plasticity, that allow populations to persist in novel environmental conditions. Although evidence for climate-induced phenotypic change in populations is widespread, evidence documenting that these phenotypic changes are due to microevolution is exceedingly rare. In this study, we use 32 years of genetic data (17 complete generations) to determine whether there has been a genetic change towards earlier migration timing in a population of pink salmon that shows phenotypic change; average migration time occurs nearly two weeks earlier than it did 40 years ago.

POLICY, MANAGEMENT AND PUBLIC EDUCATION

Record Heat Wave Pushes US Belief in Climate Change to 70%

A record heat wave, drought and catastrophic wildfires are accomplishing what climate scientists could not: convincing a wide swath of Americans that global temperatures are rising. In the four months since March there has been a jump in U.S. citizens' belief that climate change is taking place, especially among independent voters and those in southern states such as Texas, which is now in its second year of record drought, according to nationwide polls by the University of Texas.

First Stewards Symposium: Coastal Peoples Address Climate Change to Be Held July 17 - July 20, 2012 in Washington, D.C.

The symposium will bring together coastal indigenous tribal elders, leaders, scientists, and other scientists and policy leaders from around the nation to discuss traditional ecological knowledge and what it can teach us about past, present, and future adaptation to climate change. The event will include four regional panels (the West Coast states; Alaska; the U.S. Pacific states and territories; and the Great Lakes, Northeast, Mid-Atlantic, Southeast, and Gulf of Mexico states) of tribal leaders. Tribal and Western scientists will examine how native people and their cultures have adapted to climate change for hundreds to thousands of years, and what their future - and that of the nation - may hold as the impacts of climate change continue. This inaugural event will be hosted by several tribes in

collaboration with the Smithsonian National Museum of the American Indian, NOAA, and other partners. The symposium dialogue will identify ways indigenous cultures may be able to increase their resilience and adaptability to predicted climate change impacts. For more information, please visit: http://firststewards.org/welcome/.

U.S. Court of Appeals for the D.C. Circuit Upholds EPA Emissions Standards

The U.S. Court of Appeals for the D.C. Circuit this week upheld EPA's Endangerment Finding and greenhouse gas regulations issued under the Clean Air Act for passenger vehicles and Clean Air Act permitting for stationary sources. EPA Administrator Lisa P. Jackson stated, "I am pleased that the U.S. Court of Appeals for the D.C. Circuit found that EPA followed both the science and the law in taking common-sense, reasonable actions to address the very real threat of climate change by limiting greenhouse gas pollution from the largest sources." In 2007, the Supreme Court ruled in Massachusetts v. EPA that greenhouse gases are covered by the Clean Air Act's definition of air pollutant and that EPA must determine whether or not emissions of greenhouse gases from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. EPA was challenged through a group of lawsuits over its actions resulting from the Supreme Court decision to address greenhouse gases, including the 2009 Endangerment Finding, the Light Duty Vehicle Rule, and the Tailoring Rule. For more information, visit: http://epa.gov/climatechange/endangerment/ghgcourtdecision.html.

Illustrating The Explosion Of Daily High Temperature Records

As the climate has warmed during the past several decades, there has been a growing imbalance between record daily high temperatures in the contiguous U.S. and record daily lows. A study published in 2009 found that rather than a 1-to-1 ratio, as would be expected if the climate were not warming, the ratio has been closer to 2-to-1 in favor of warm temperature records during the past decade (2000-2009). This finding cannot be explained by natural climate variability alone, the study found, and is instead consistent with global warming.